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123 Kent Road, Pacifica CA 94044

What are LASERS good for?

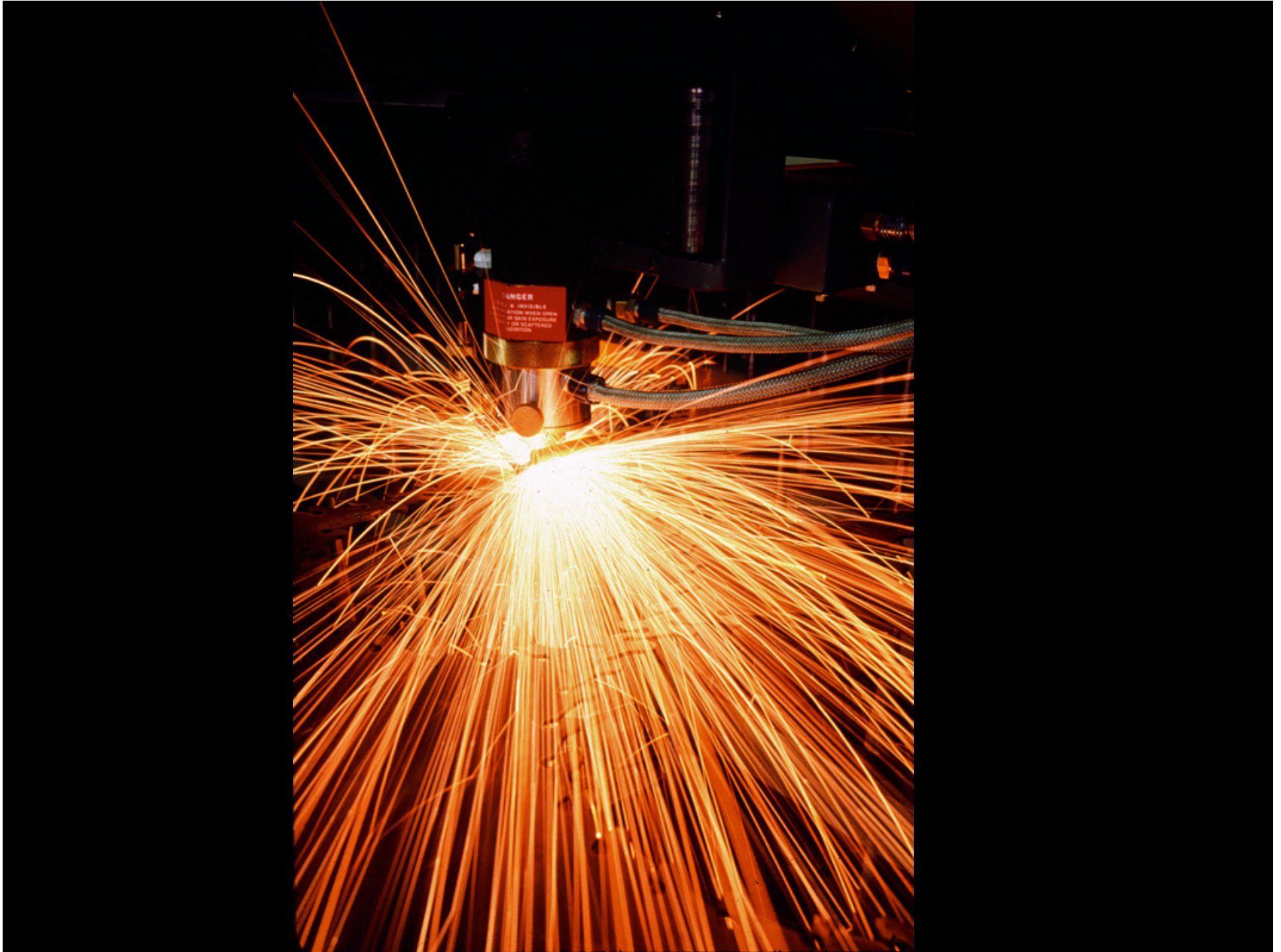


**What are  
LASERS  
good for?**

# Material Processing

## 1. Macro processing

# CO2 cutting saw

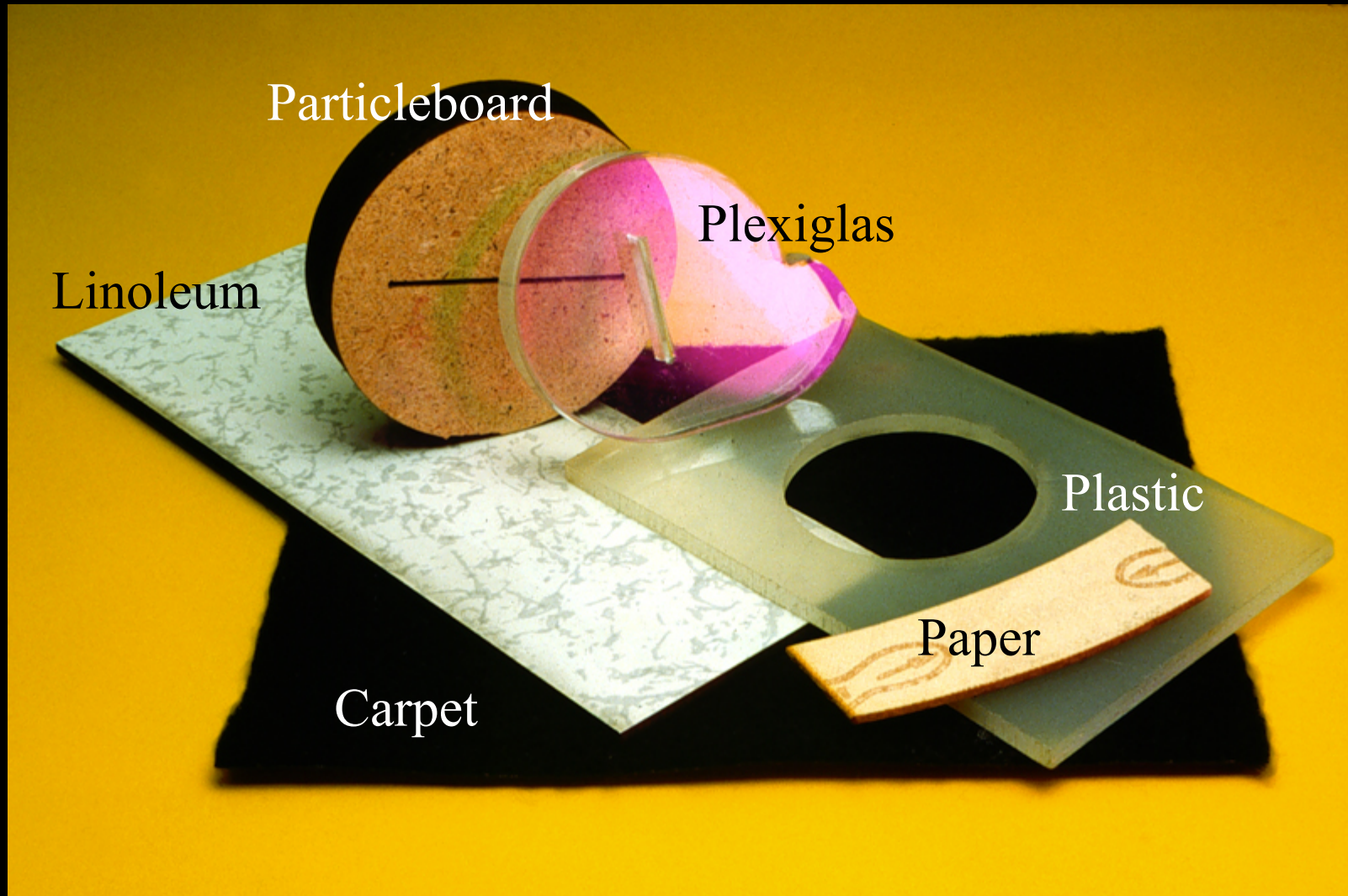




# Saw edge quality

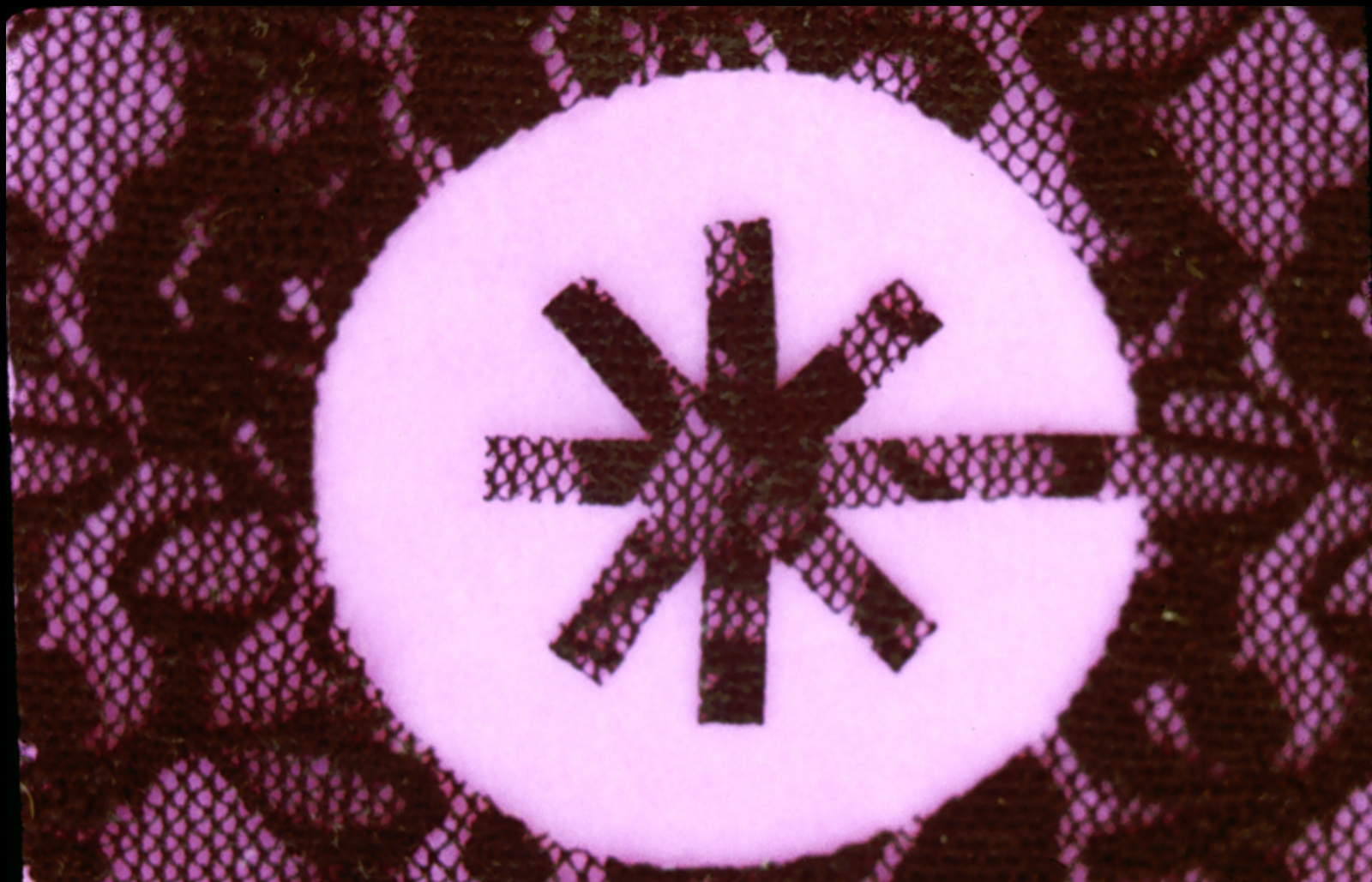


# Non-metal examples





# Lace edge quality



## Laser welding





# Laser marking: pliers

Laser marking



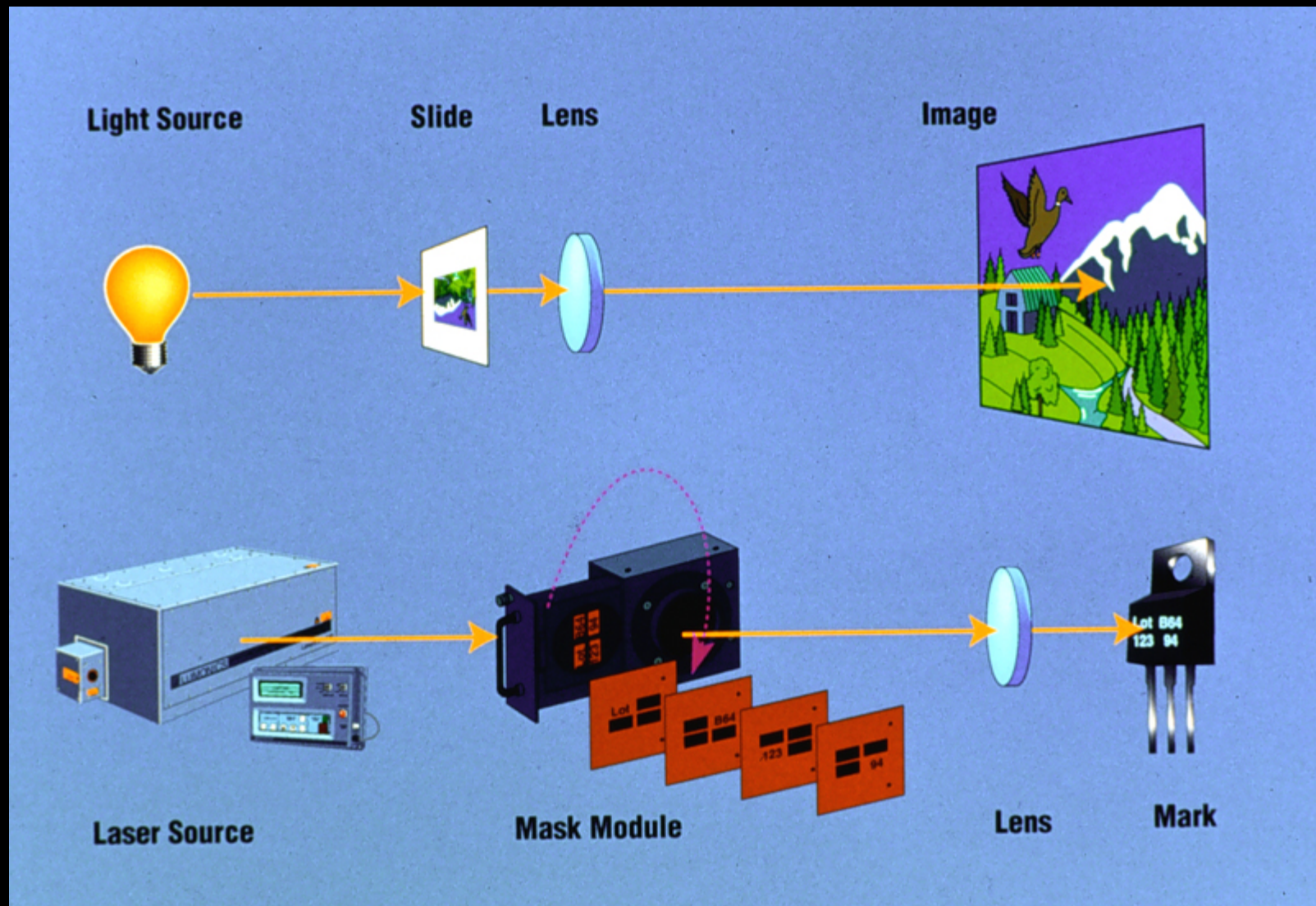
## Laser marking

012345678912



# Laser marking techniques

## Laser marking



**Laser marking**

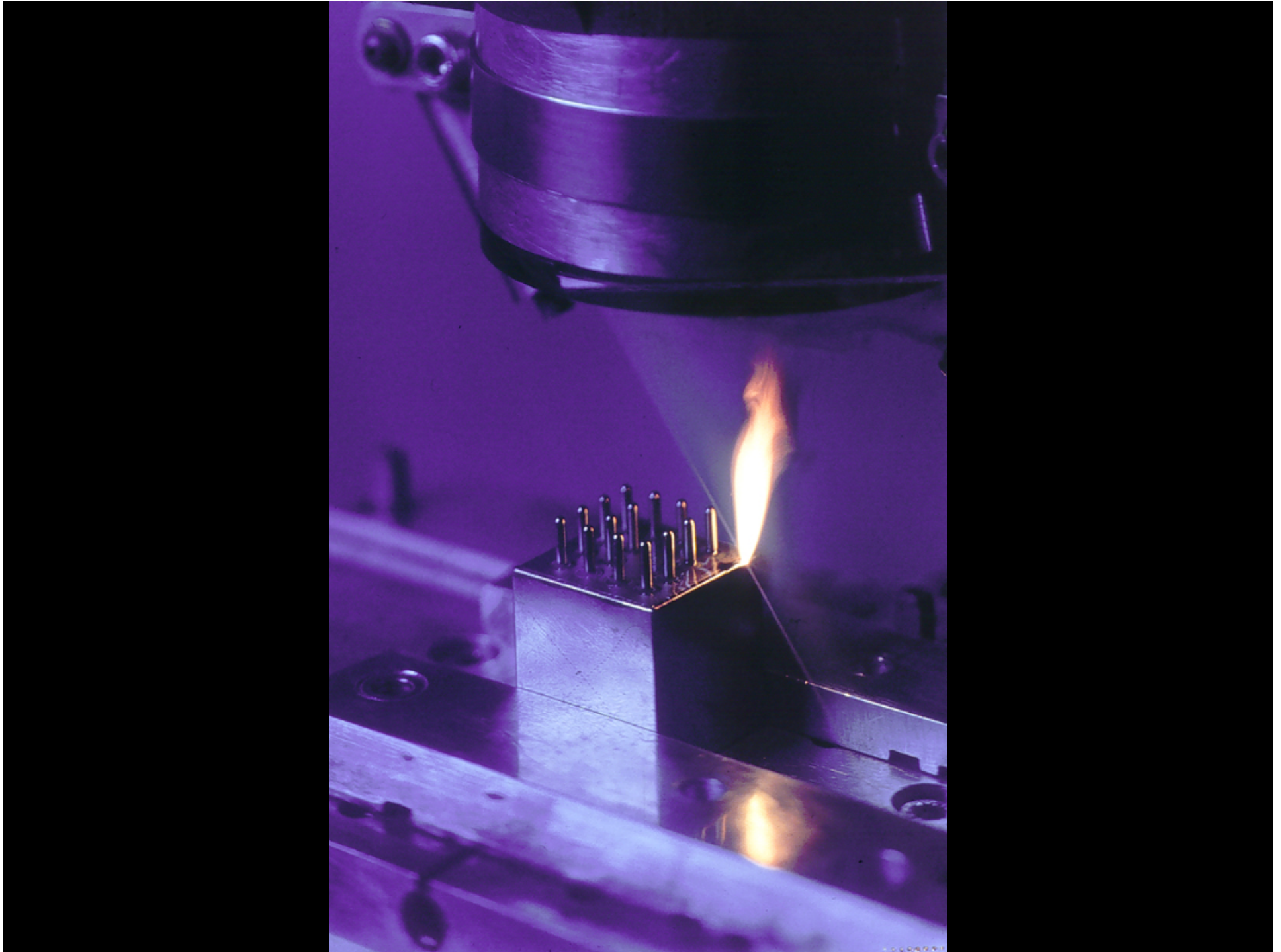




# Material Processing

1. Macro processing
2. Mini-, micro-, and nanoprocessing

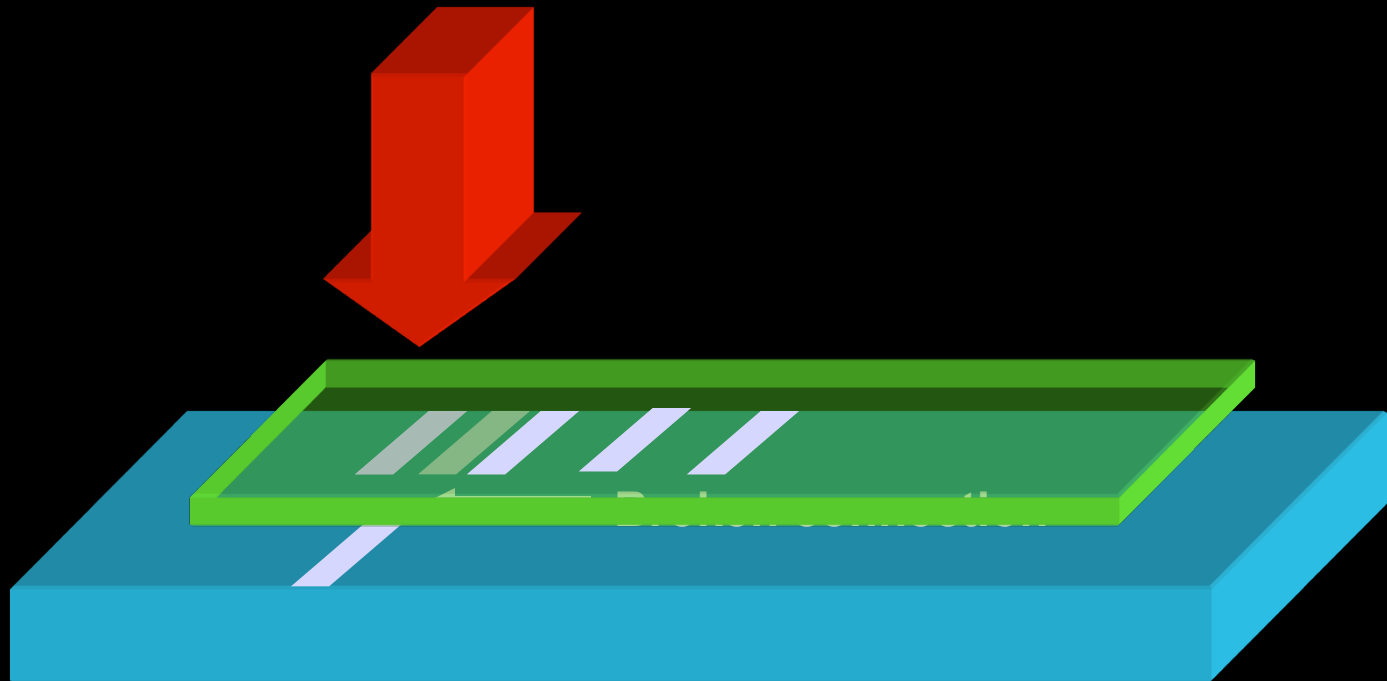
# Circuit can



# LCD screen

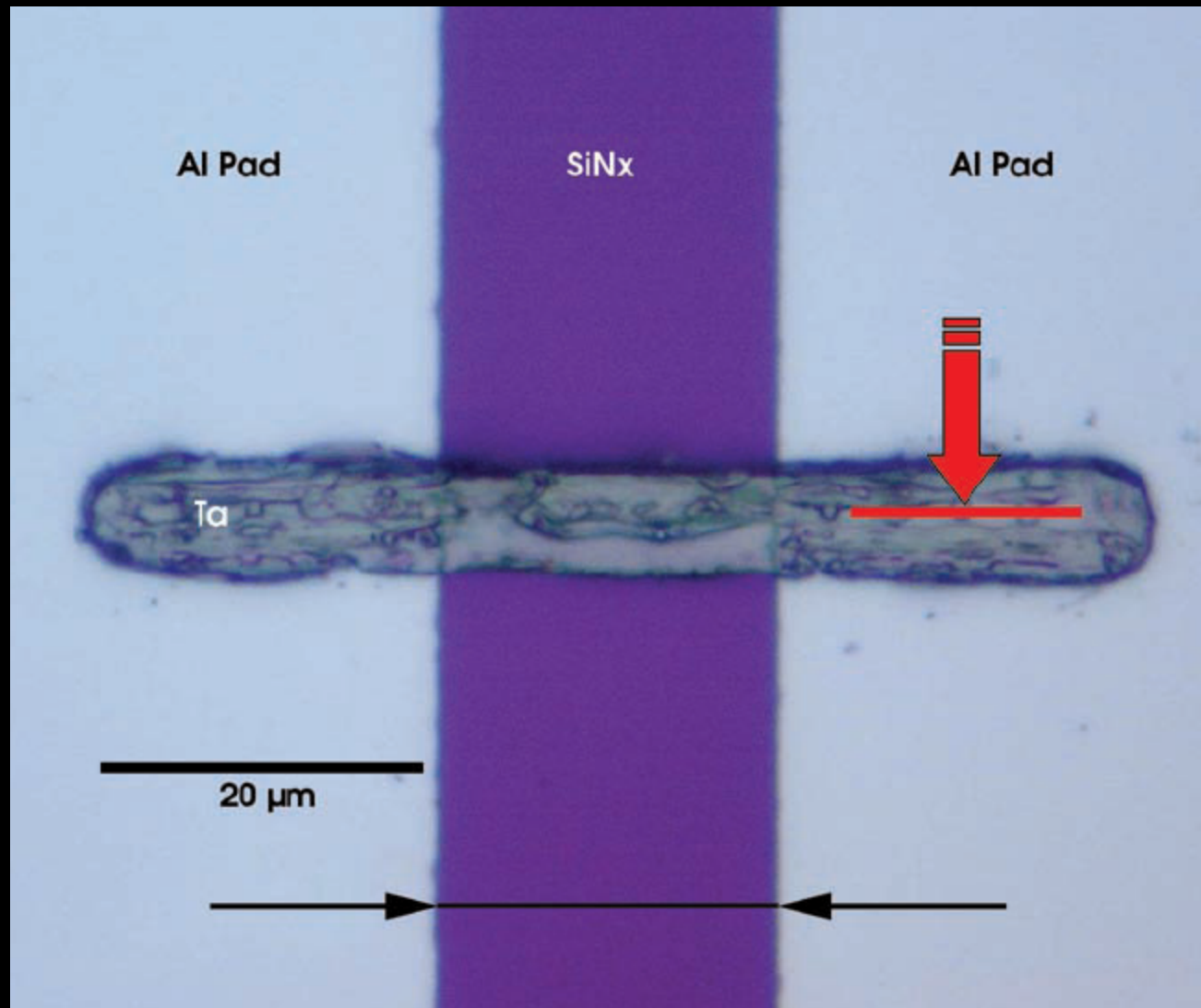


## Flat-Panel Displays



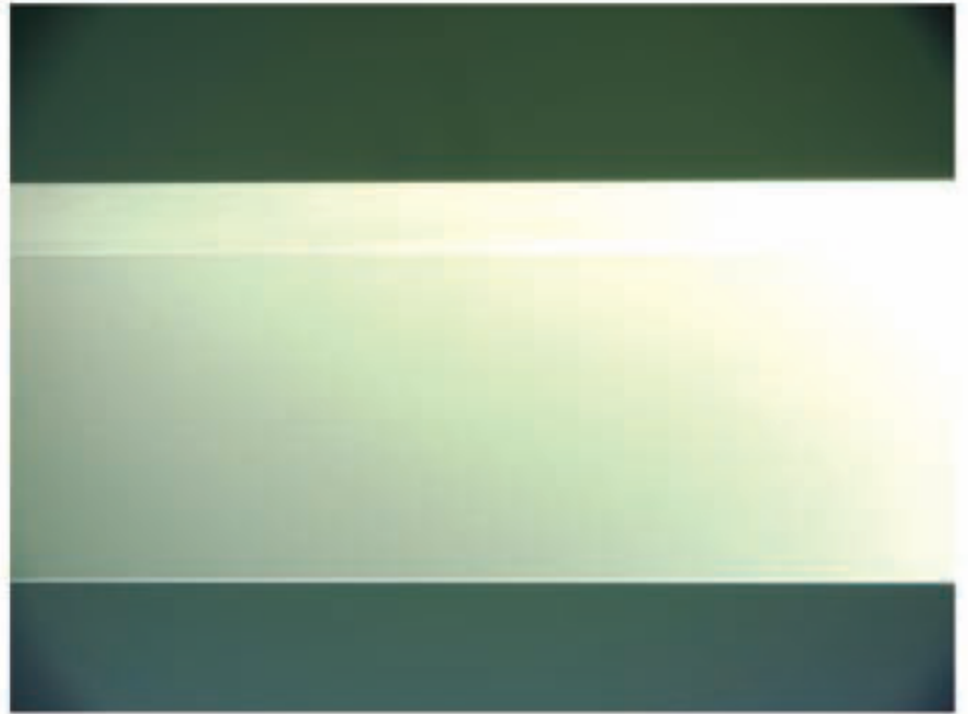
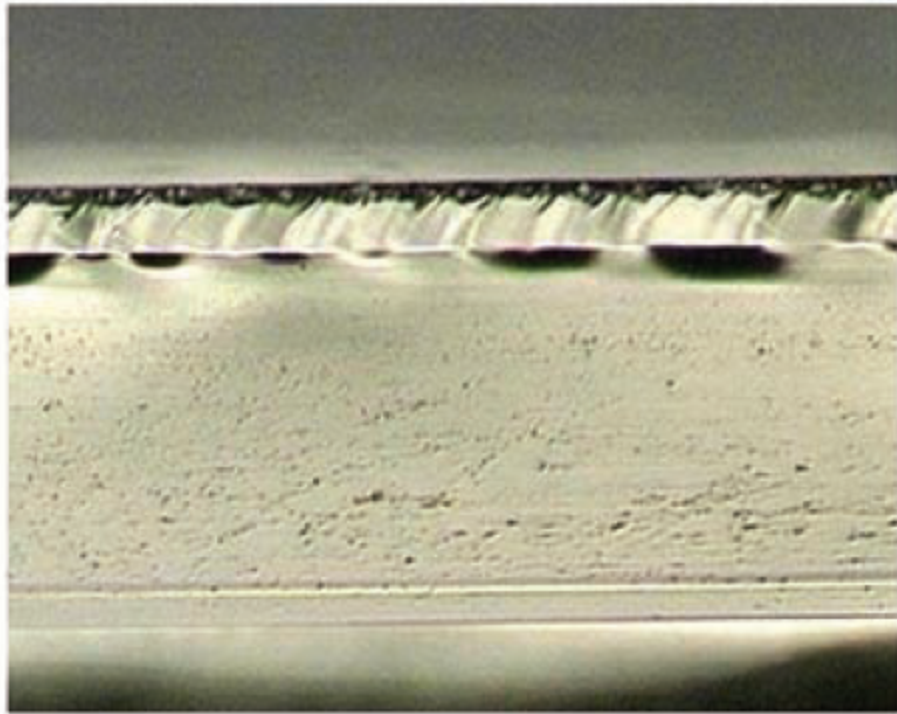
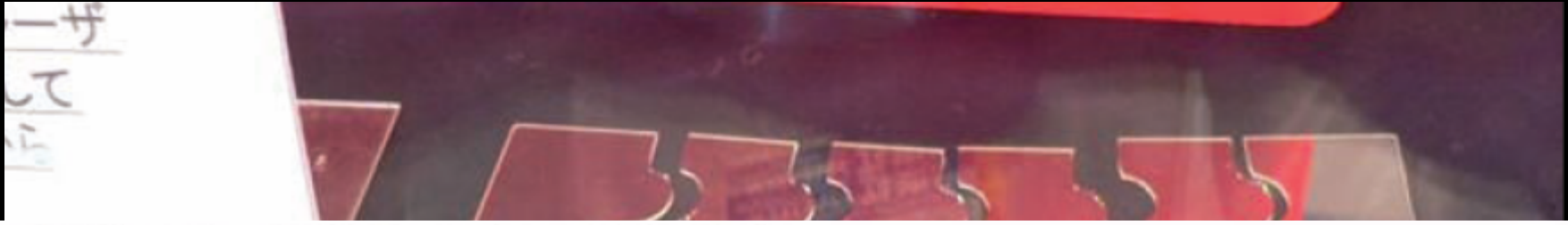


## Flat-Panel Displays

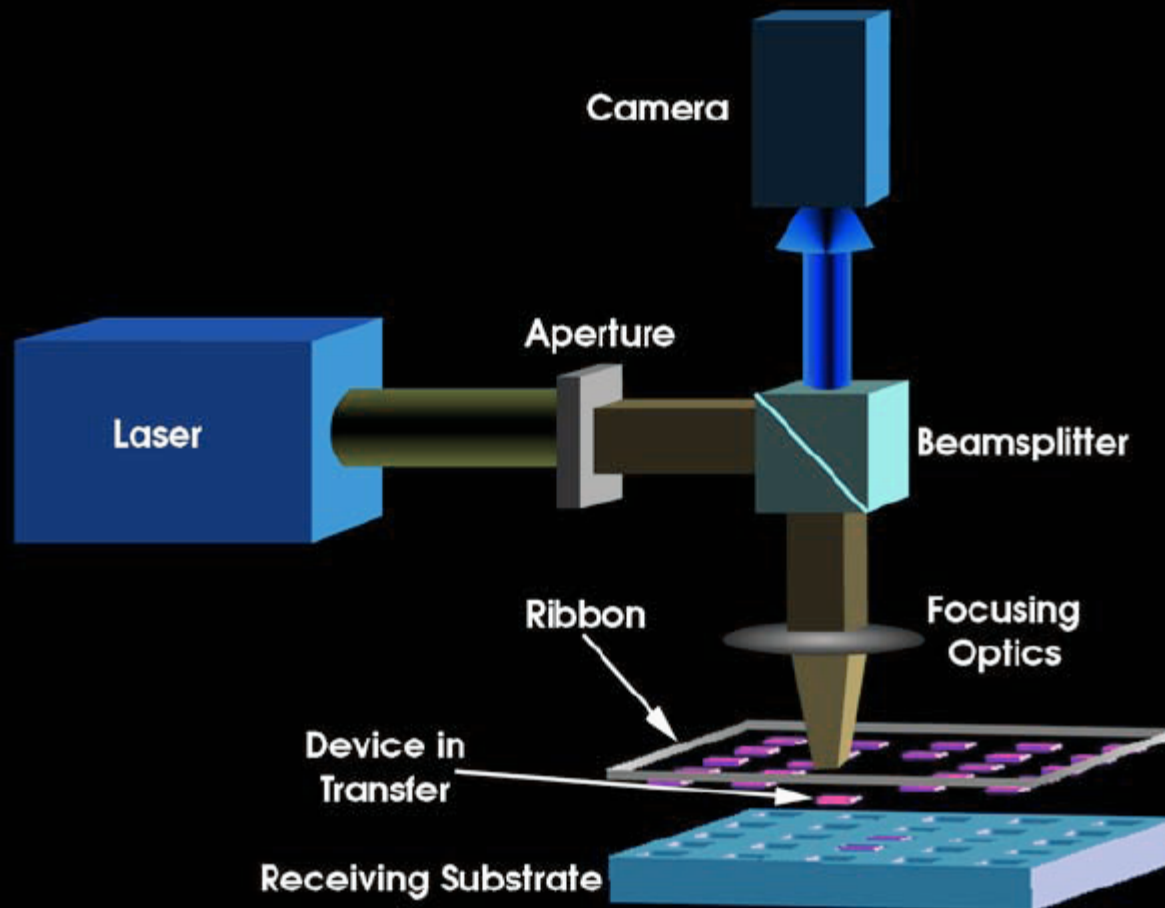


# Cutting glass

## Flat-Panel Displays

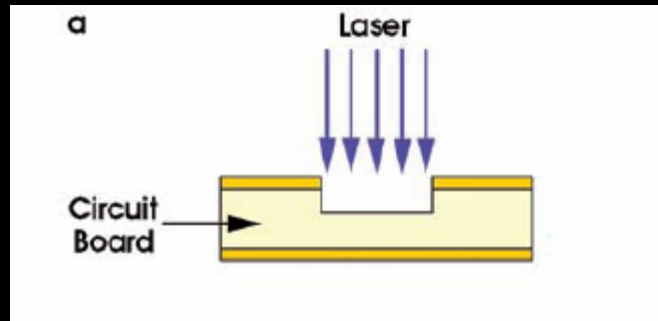


# Laser “Pick and Place”





# Laser “Pick and Place”



# **Agriculture and Construction**

# Video







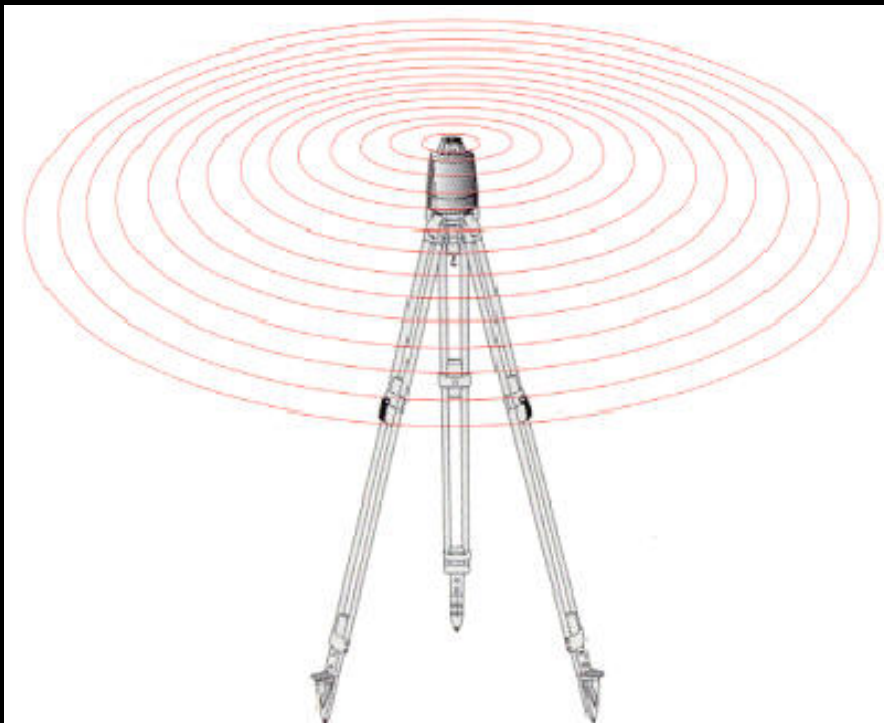
**Pipe laser**



**Rotating laser**



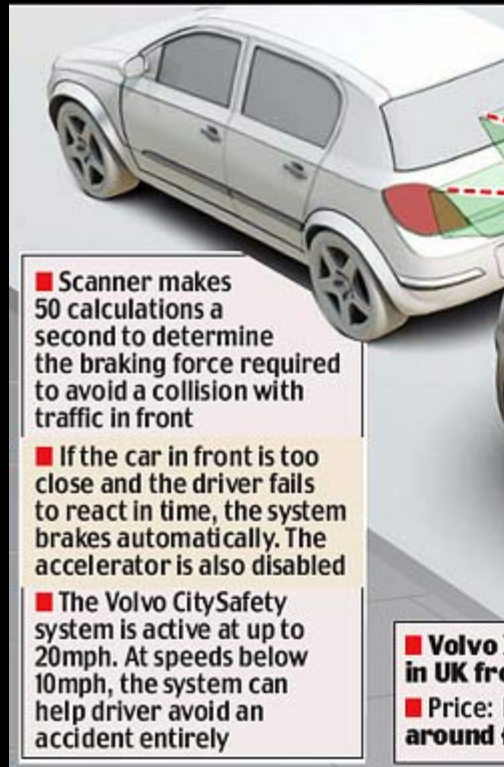
**Plumb laser**



# Test and Measurement









# Fingerprints



Powered Descent Ignition  
Altitude = 20 km

Begin Pitch Over and  
Throttle Down  
Altitude = 1 to 4 km

Begin Vertical Descent  
Altitude = 100 to 500 m

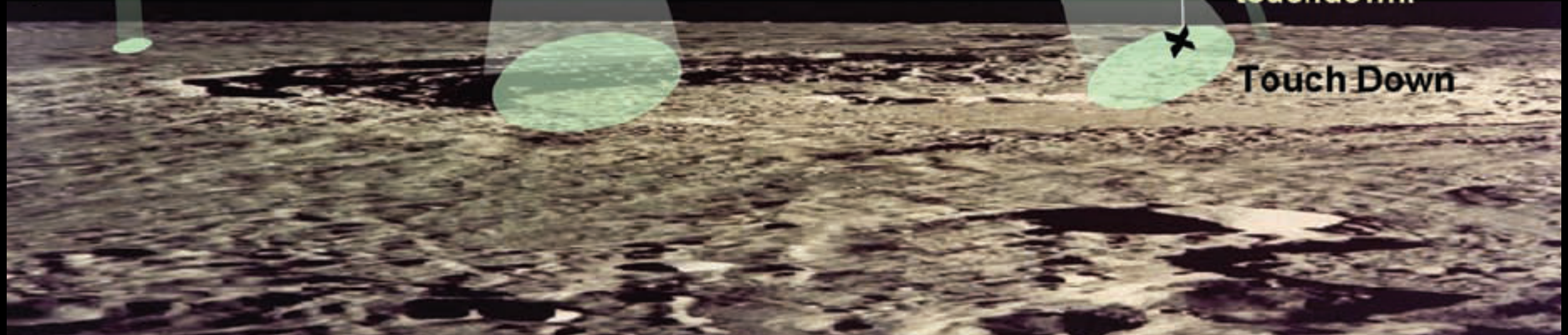
Acquire terrain  
maps to perform  
terrain-relative  
navigation.

Acquire altitude  
data for updating  
and reducing  
position errors.

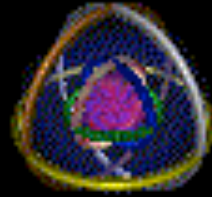
Acquire elevation  
maps of the landing  
site to identify hazardous  
features and define  
safe landing location.

Acquire velocity data  
for controlling the  
vehicle powered  
descent and  
touchdown.

Touch Down

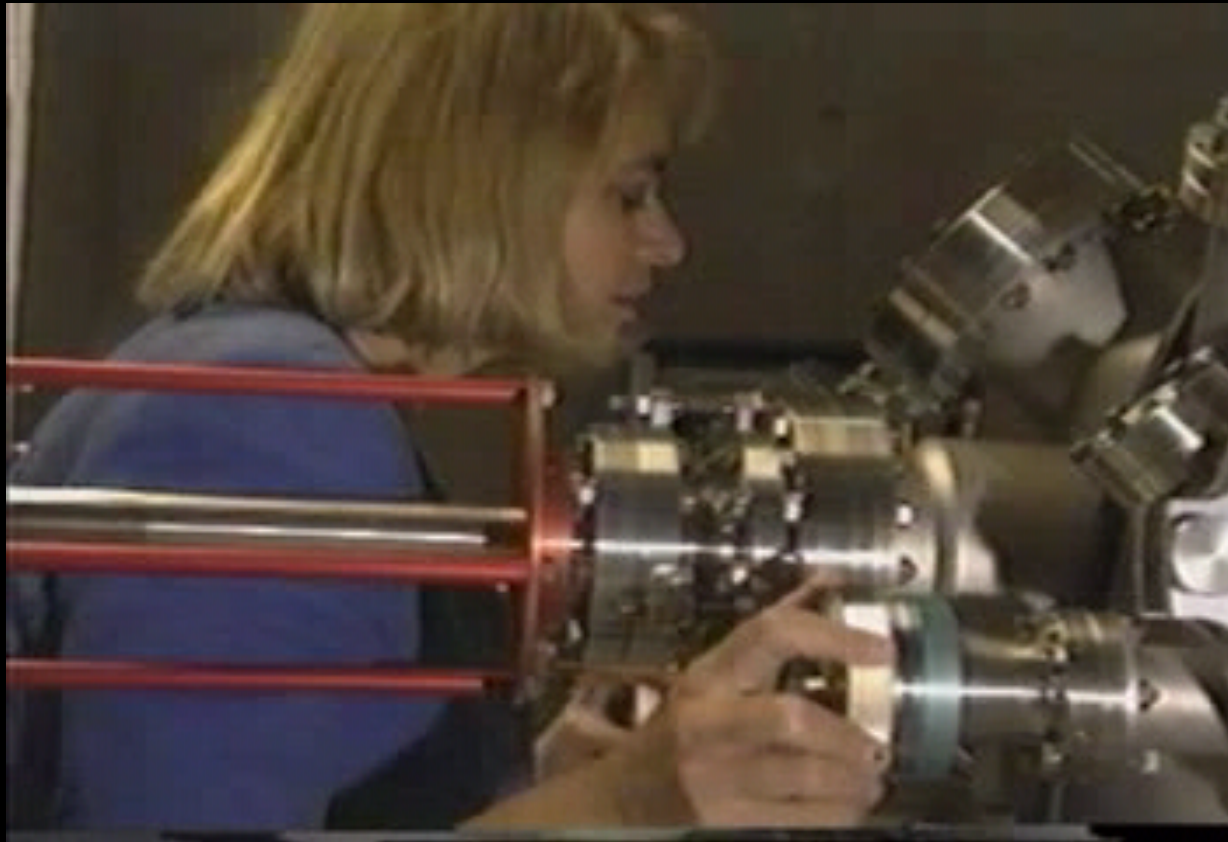




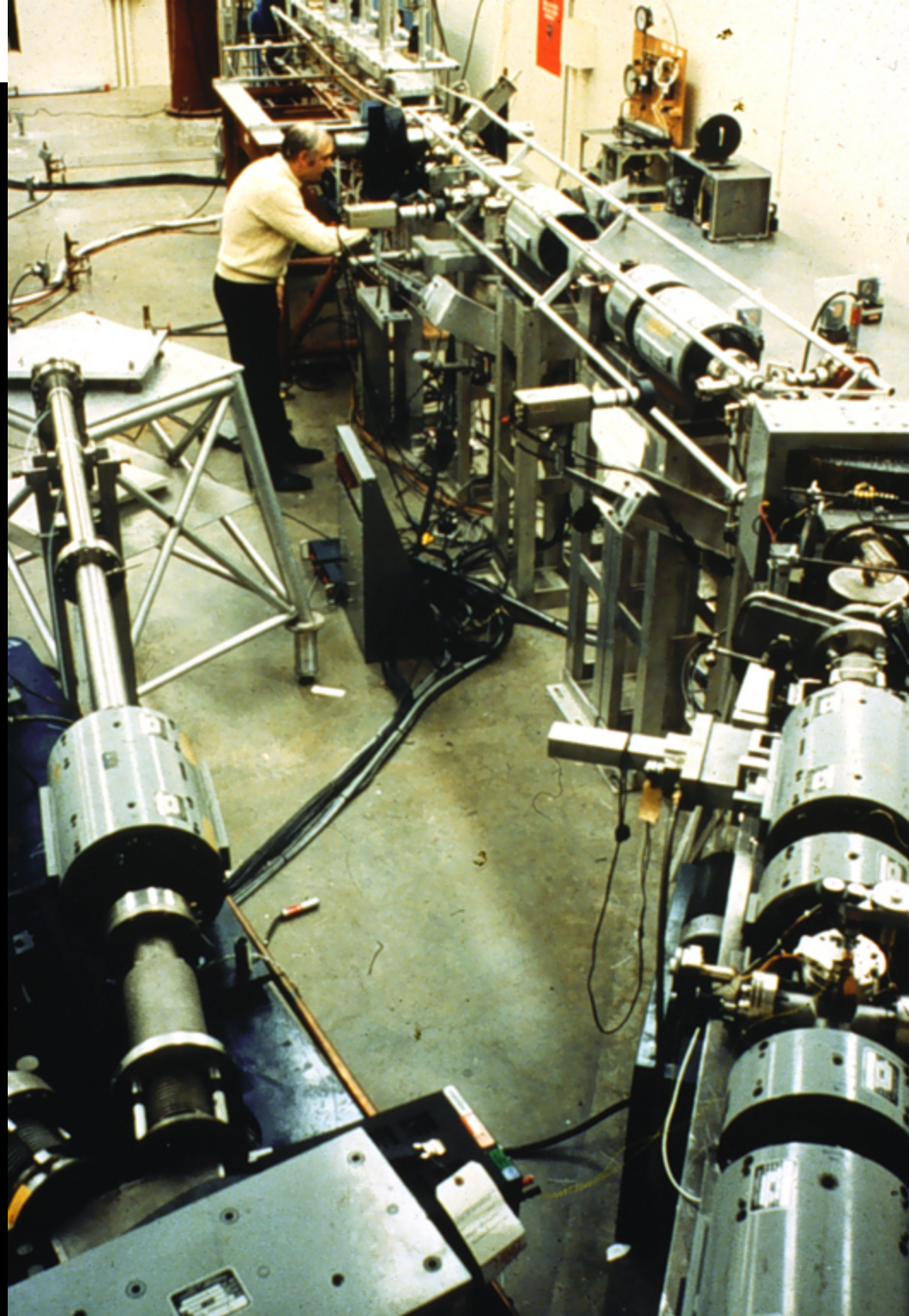


# Research and Development

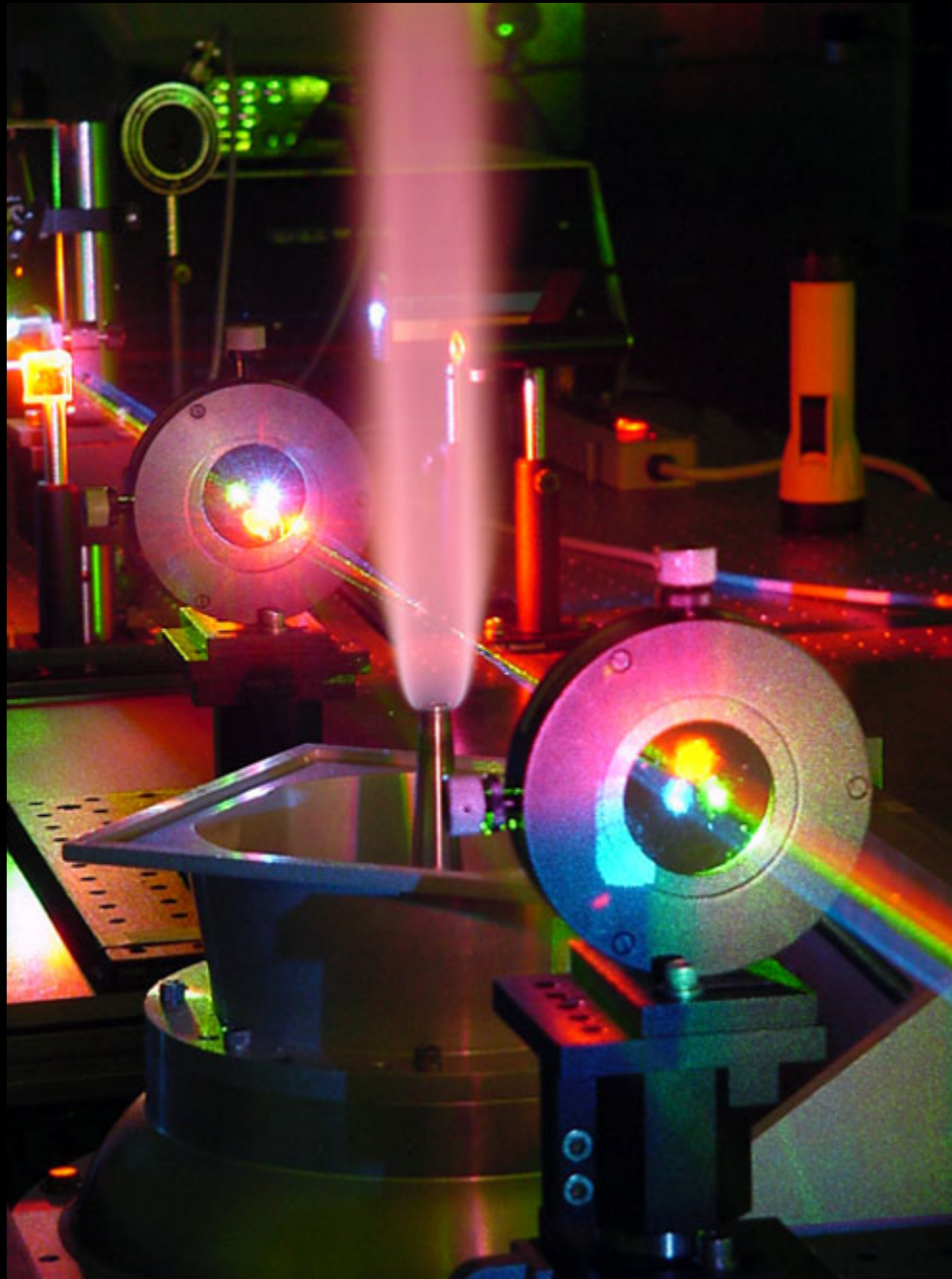
# video. alignment





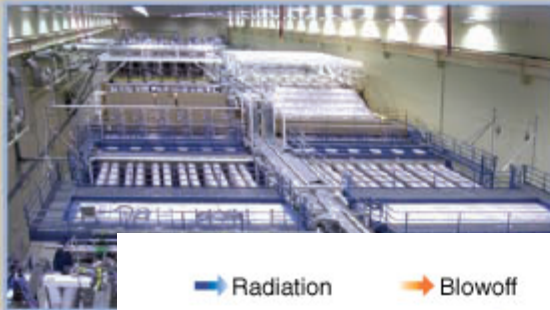


# Photo: flame spectroscopy





# Inertial Confinement Fusion (“Laser Fusion”)



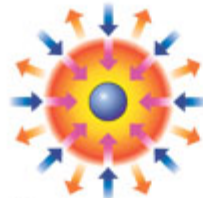
→ Radiation

→ Blowoff

→ Inward transported thermal energy



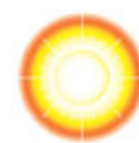
Laser beams or laser-produced x rays rapidly heat the surface of the



Fuel is compressed by the rocketlike blowoff of the hot surface material.

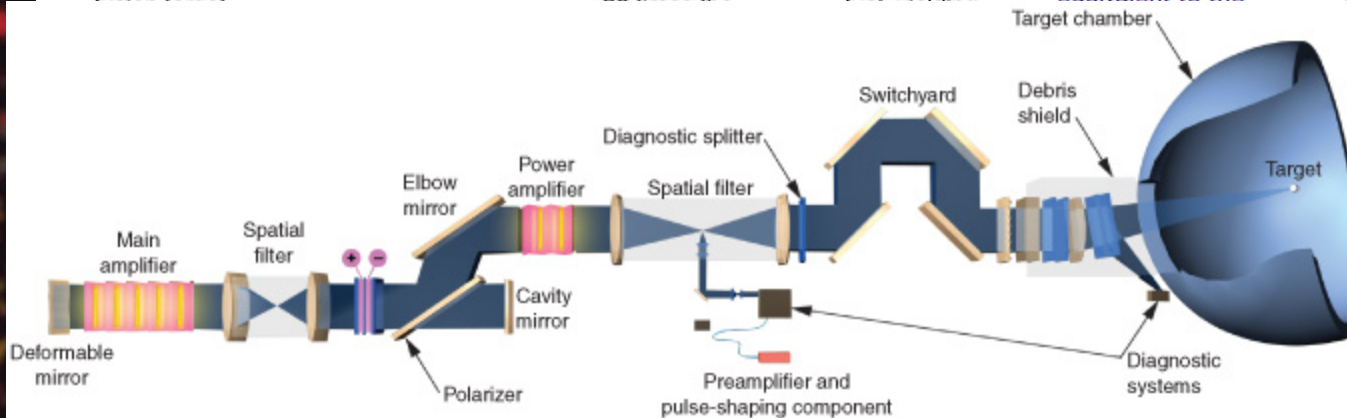


During the final part of the capsule implosion, the fuel core reaches



Thermonuclear burn spreads rapidly through the compressed

The steps of an inertial confinement fusion reaction, in which more energy is produced than is used to initiate ignition. Under laboratory conditions, the sequence produces energy gain equivalent to the







# Bar Code Scanning

# Photo, Groc store





# WORK ON LOGS



# Laser Printers



# Photos. laser printers

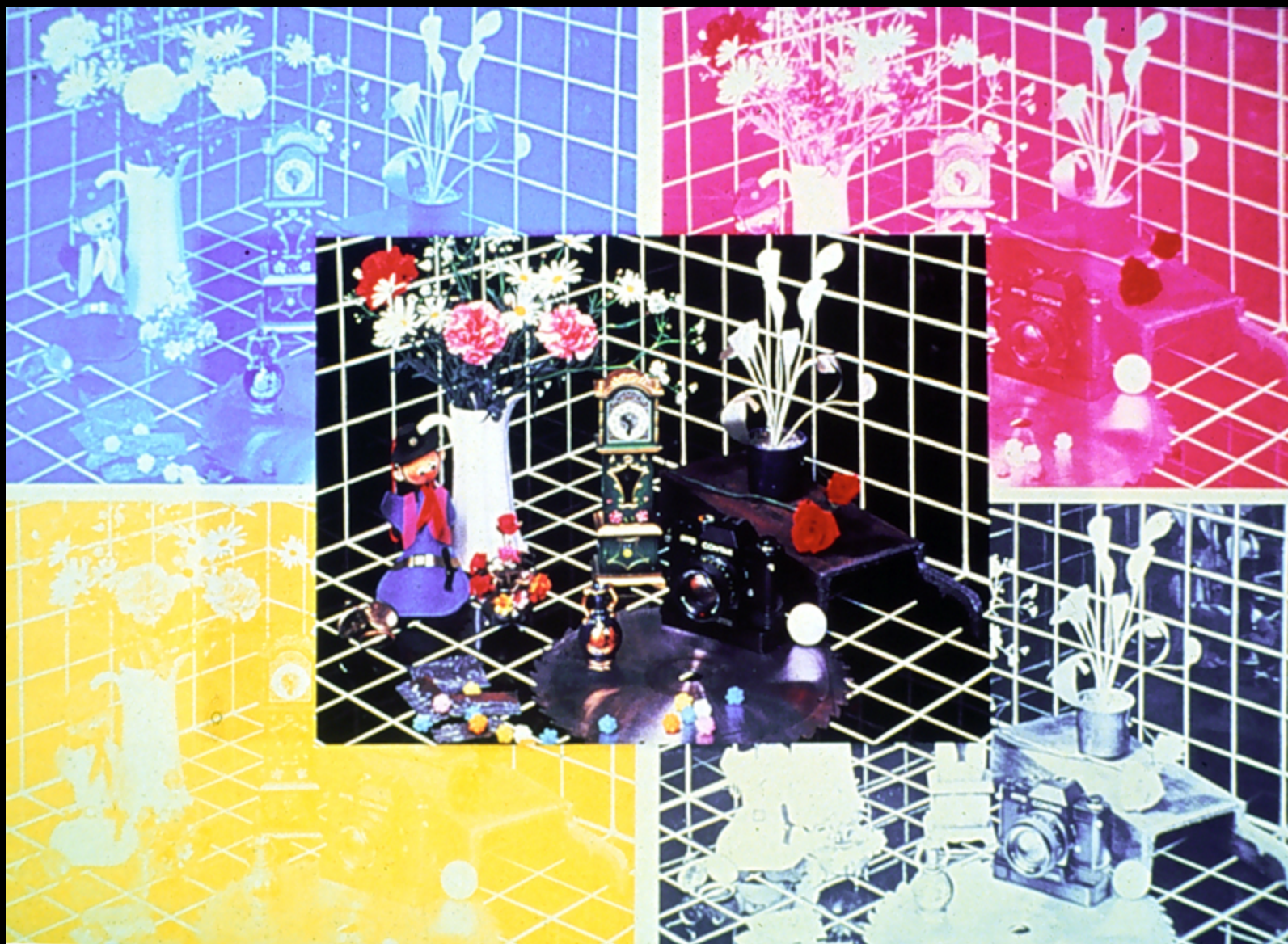


Pre-press

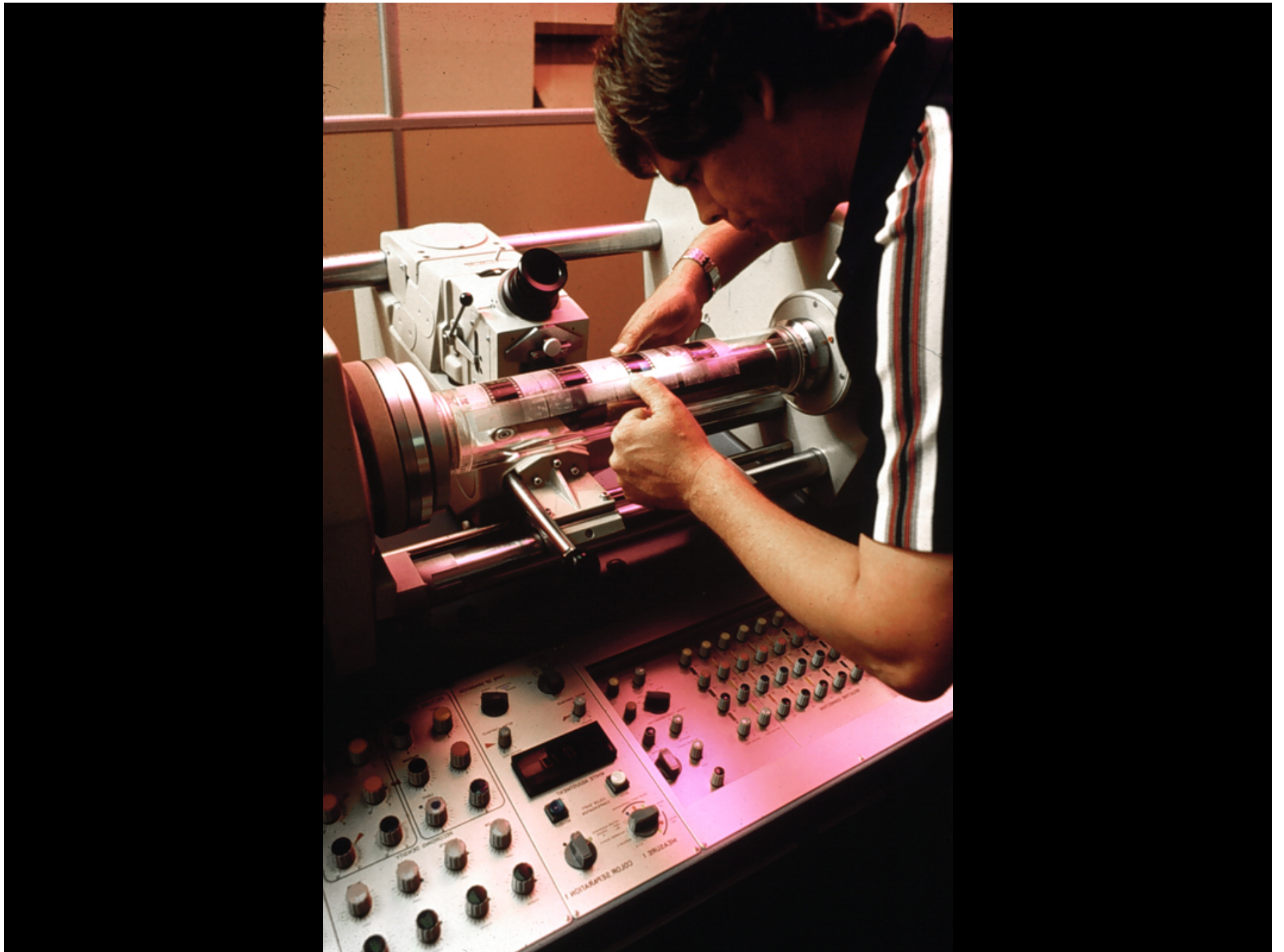
**Pre-Press**



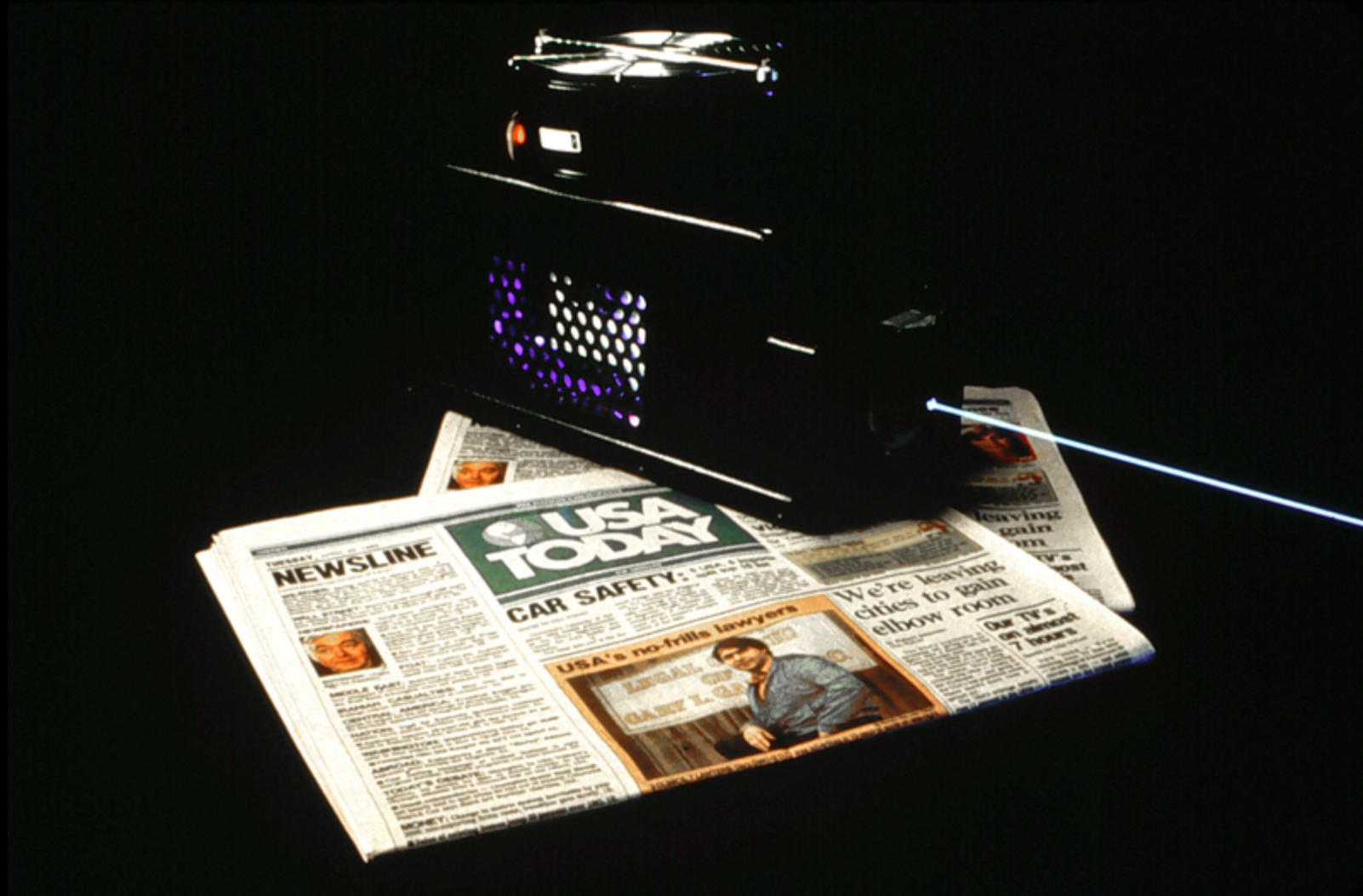
# 4 color sep



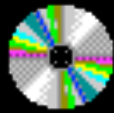




# Platemakers



# Optical



# Memories



# How DVDs

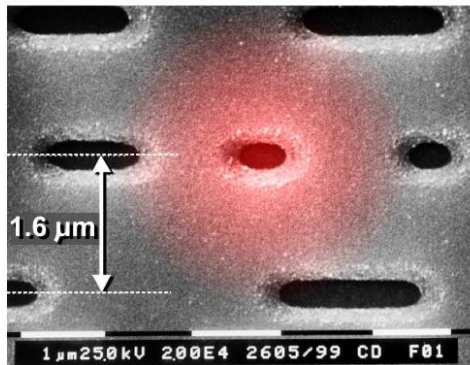
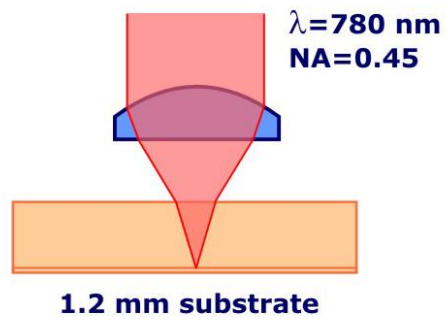


# The dark junction



# CD vs DVD vs BluRay

**CD**

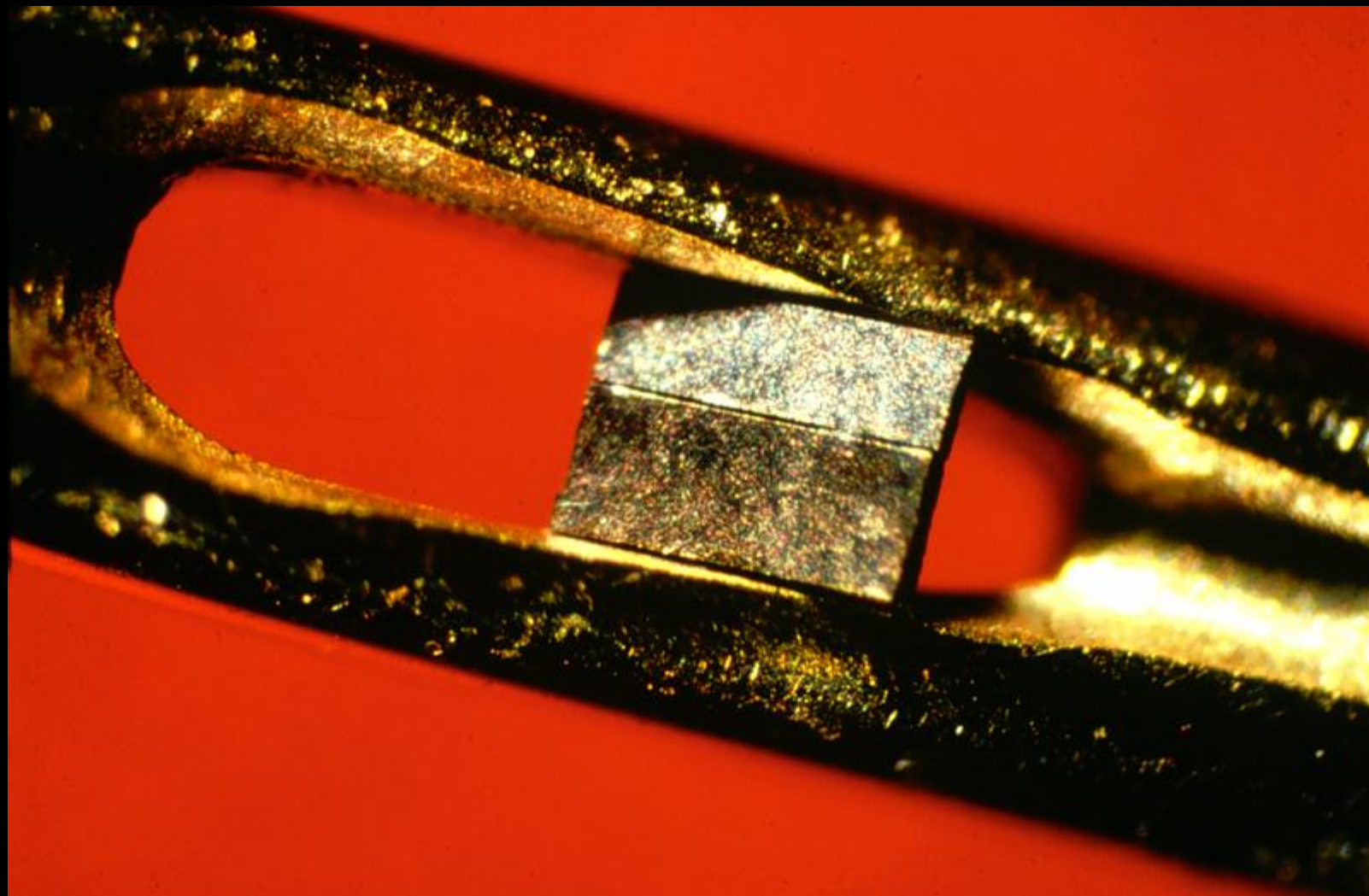


**0.7 GB**



# Optical Communication

# Diode in eye of needle



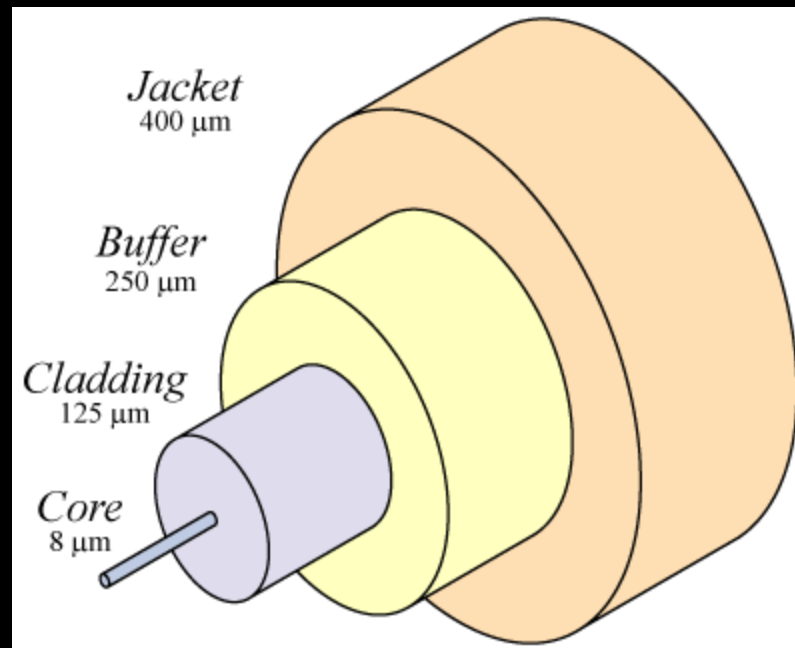


# Notes: Installing new

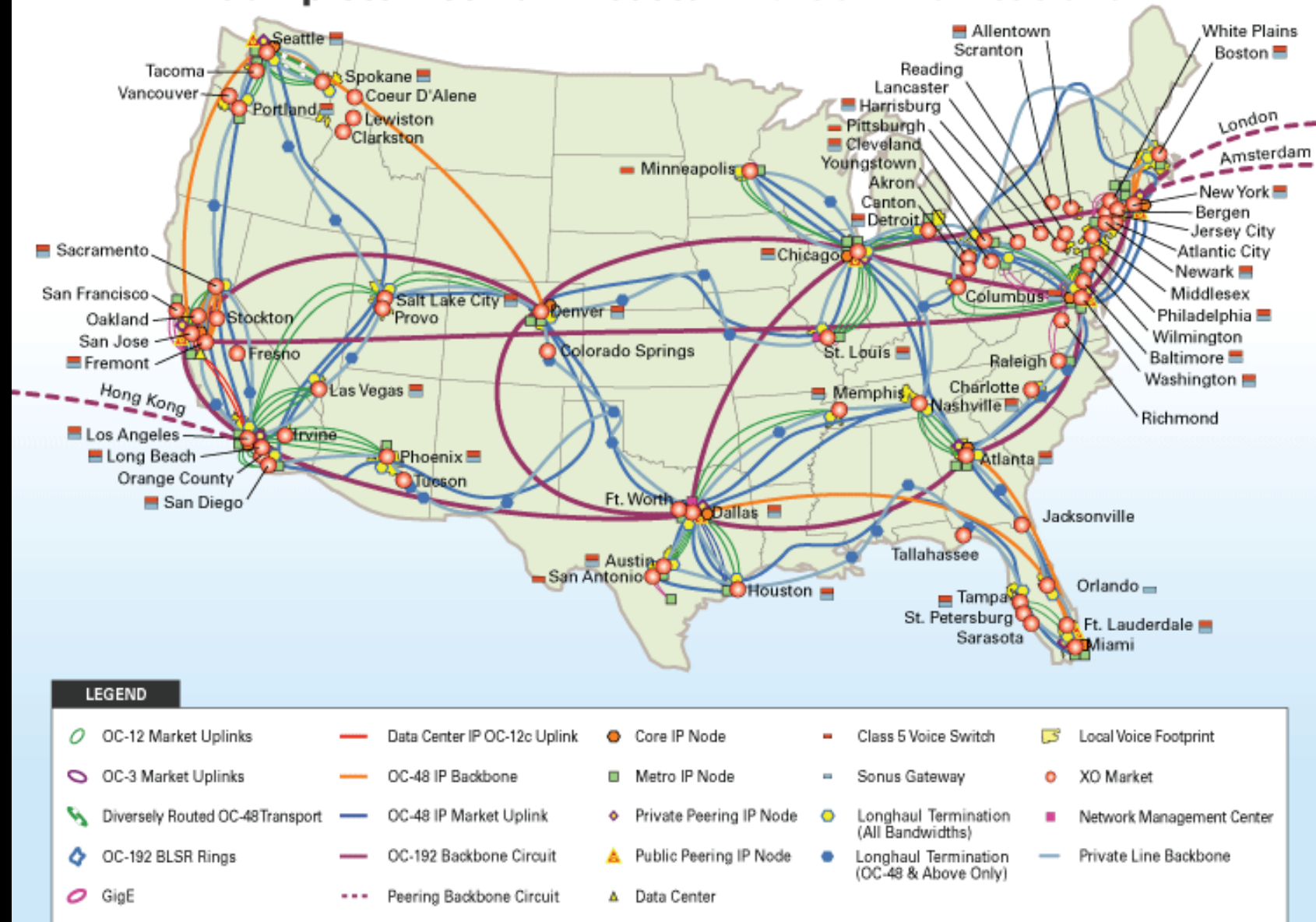




# Diagram. fiber



## Complete Network Assets : XO Communications



# Then & Now. WDM, EDFAs

Then



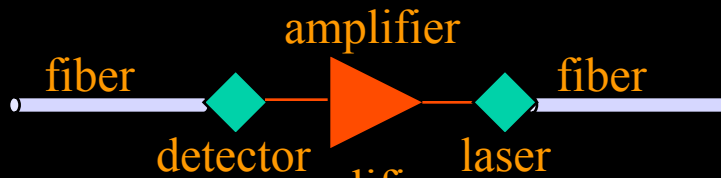
Now

Many  
[W λ]’s



“(Dense) Wavelength Division Multiplexing”  
DWDM

Then



Now



Erbium-Doped Fiber Amplifier



# Medicine

## **GENERAL SURGERY**

**Ean, nose, throat**

**Podiatry**

**Ob/Gyn**

**Orthopedics**

**Dermatology**

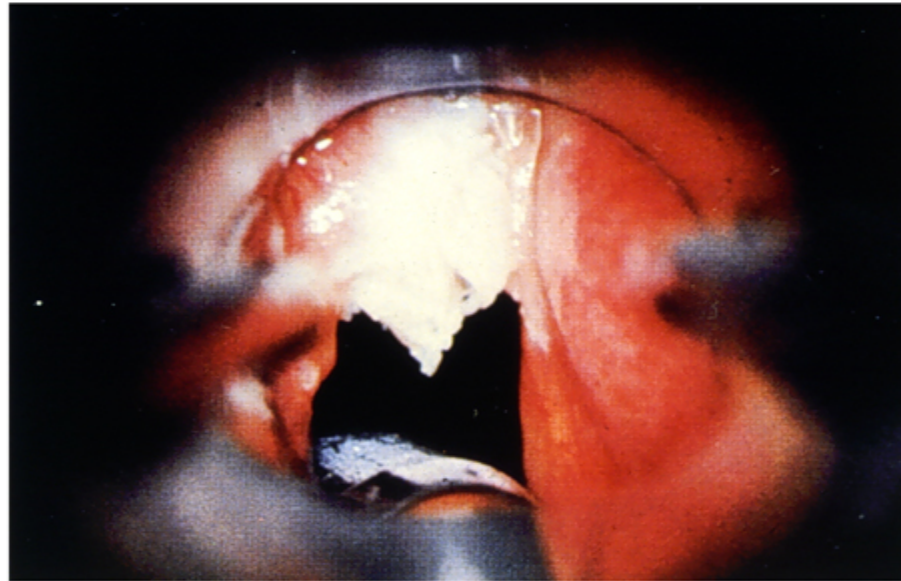
**Neurosurgery**

**(Non-endoscopic beam delivery)**

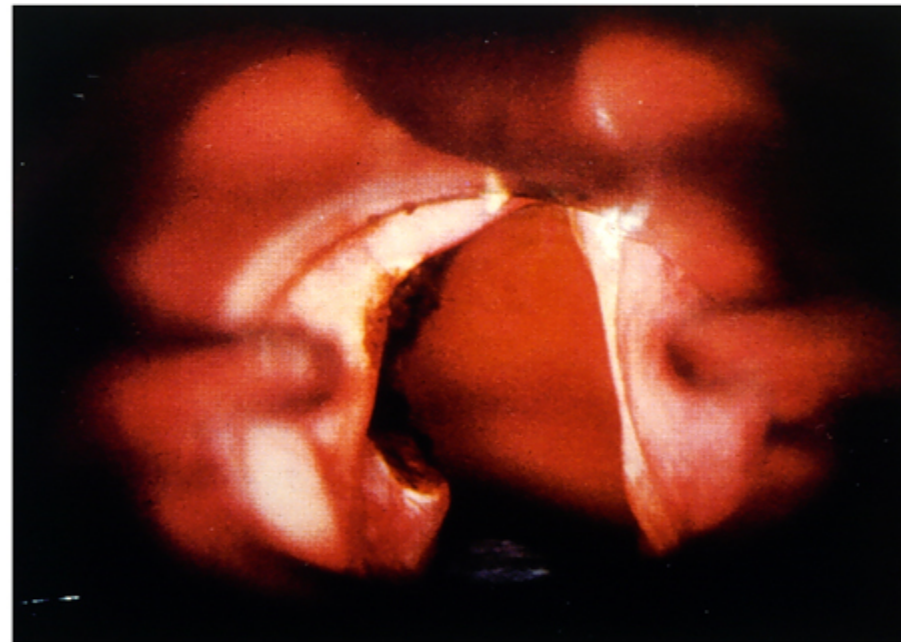








Patient with carcinoma of the vocal cord.



Same patient after CO<sub>2</sub> surgical laser removal.

# Video: wrinkle removal



Photo. tattoo before





Photo. tattoo after

Connie  
7-18-  
Tattoo

# Hair Removal



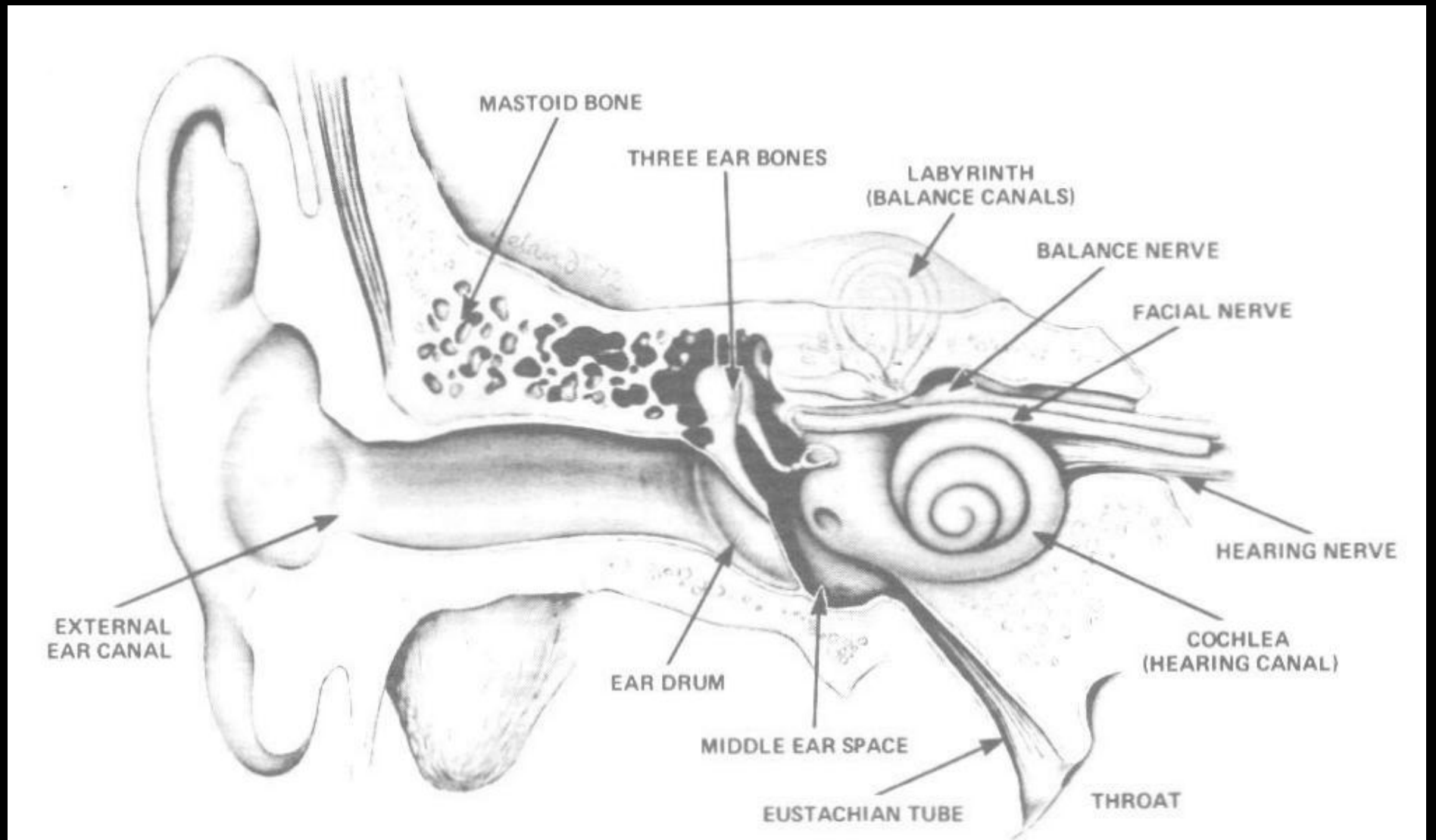


# Rodney Perkins





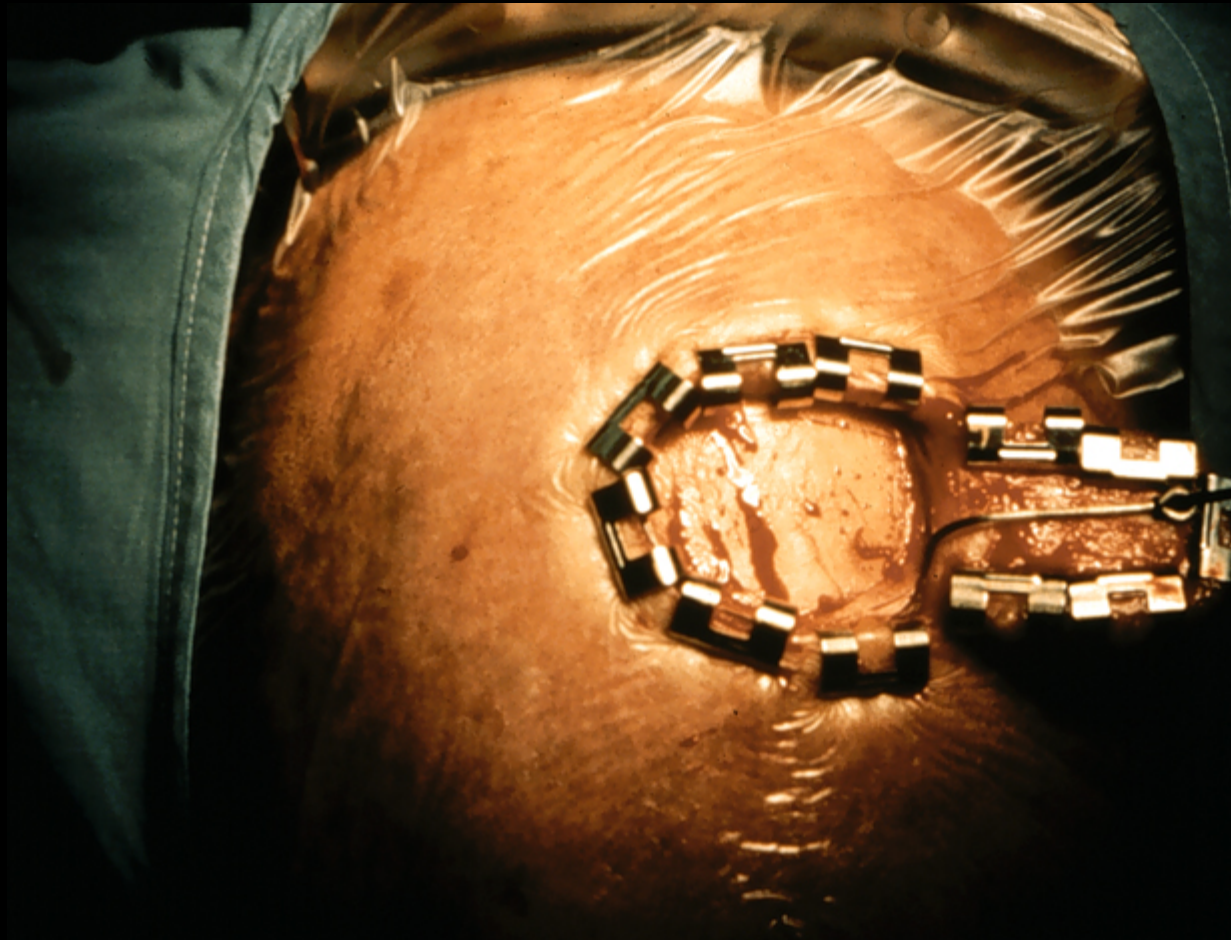
# Ear diagram



# Brain surgery

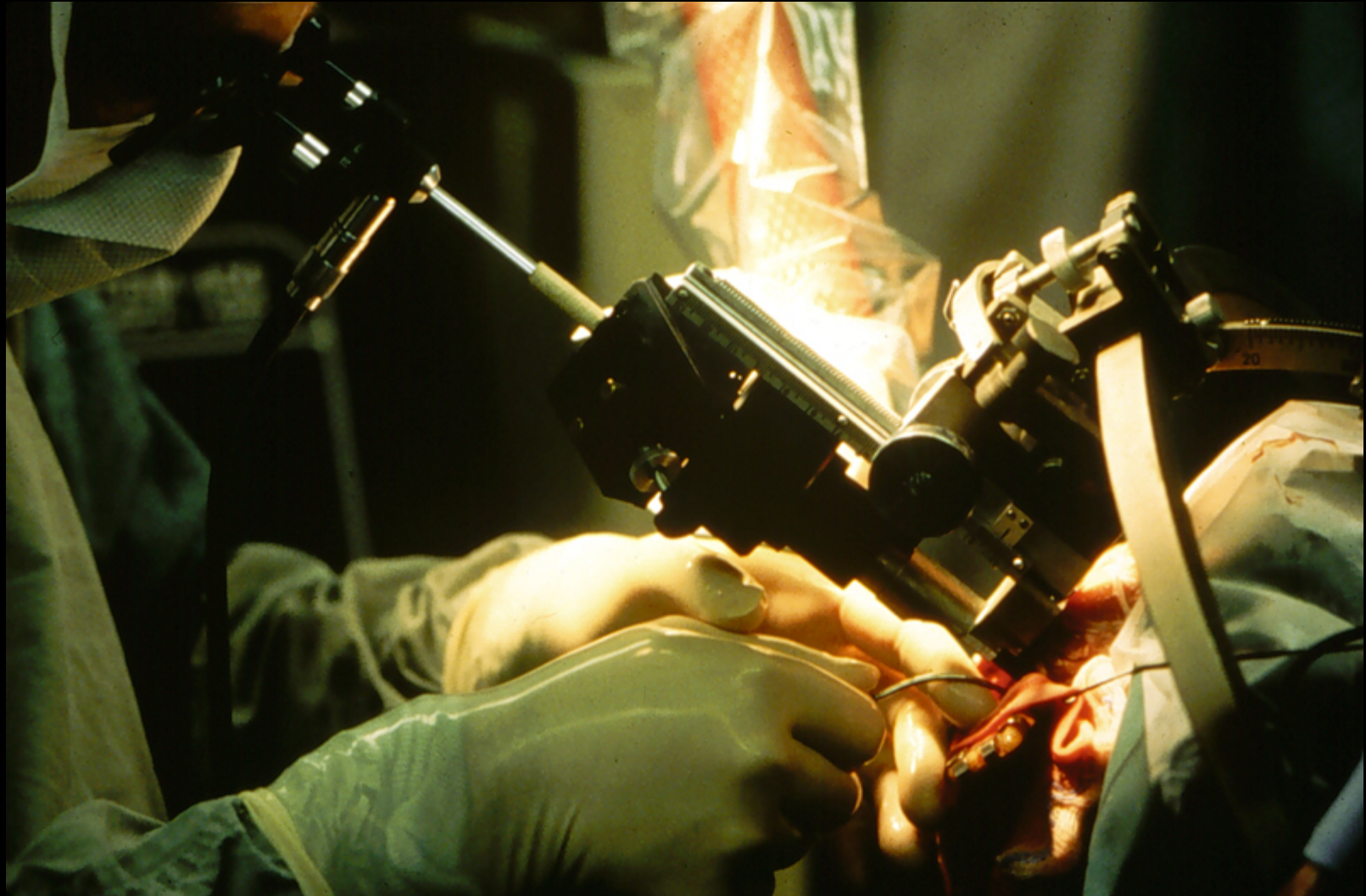


# Drain surgery





# Brain surgery



# Ophthalmology

**Retinal photocoagulation**

**Cutting vitreous strands**

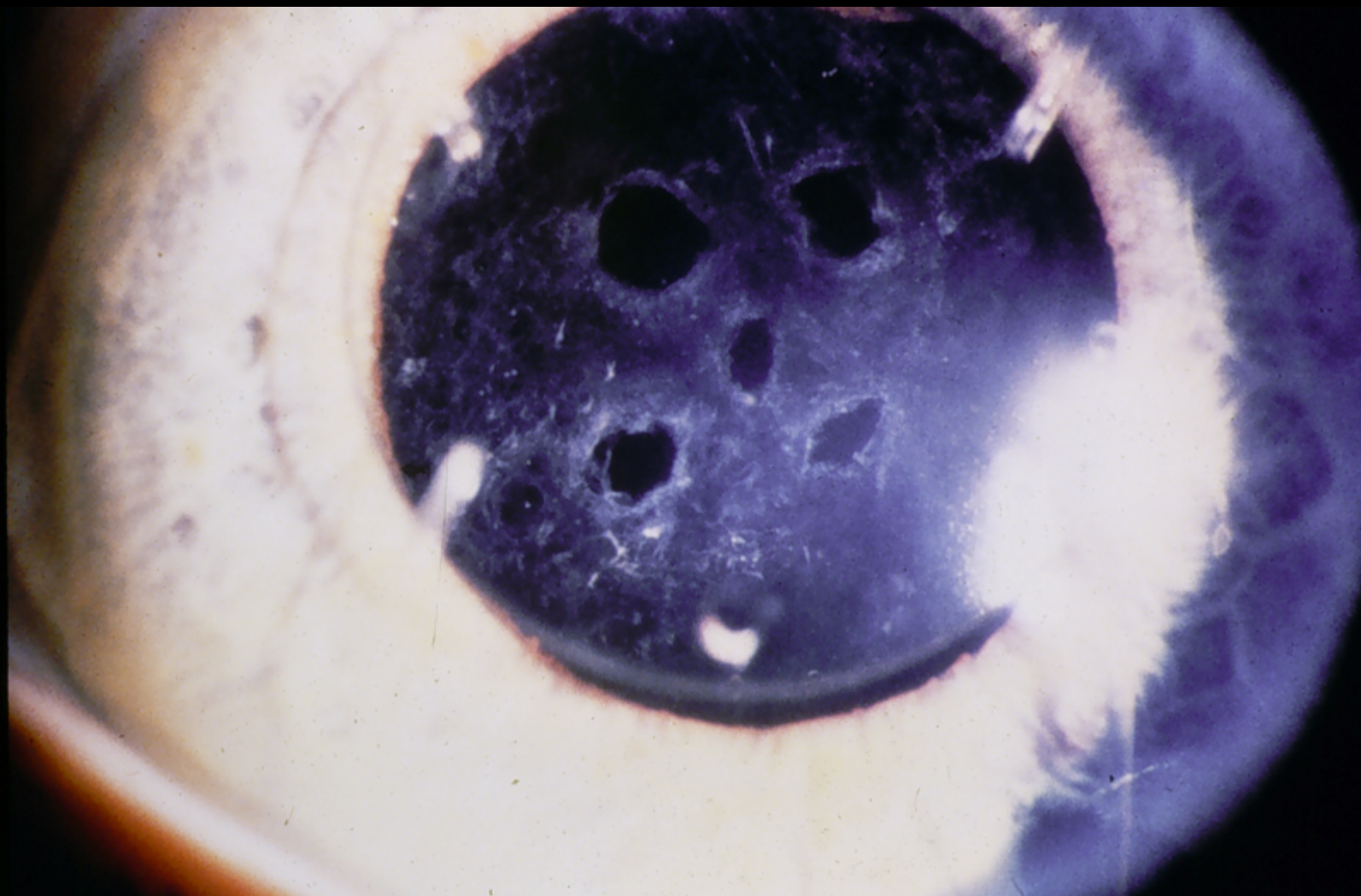
**Posterior capsulotomy**

**Iridotomy glaucoma**

**Cataract surgery**

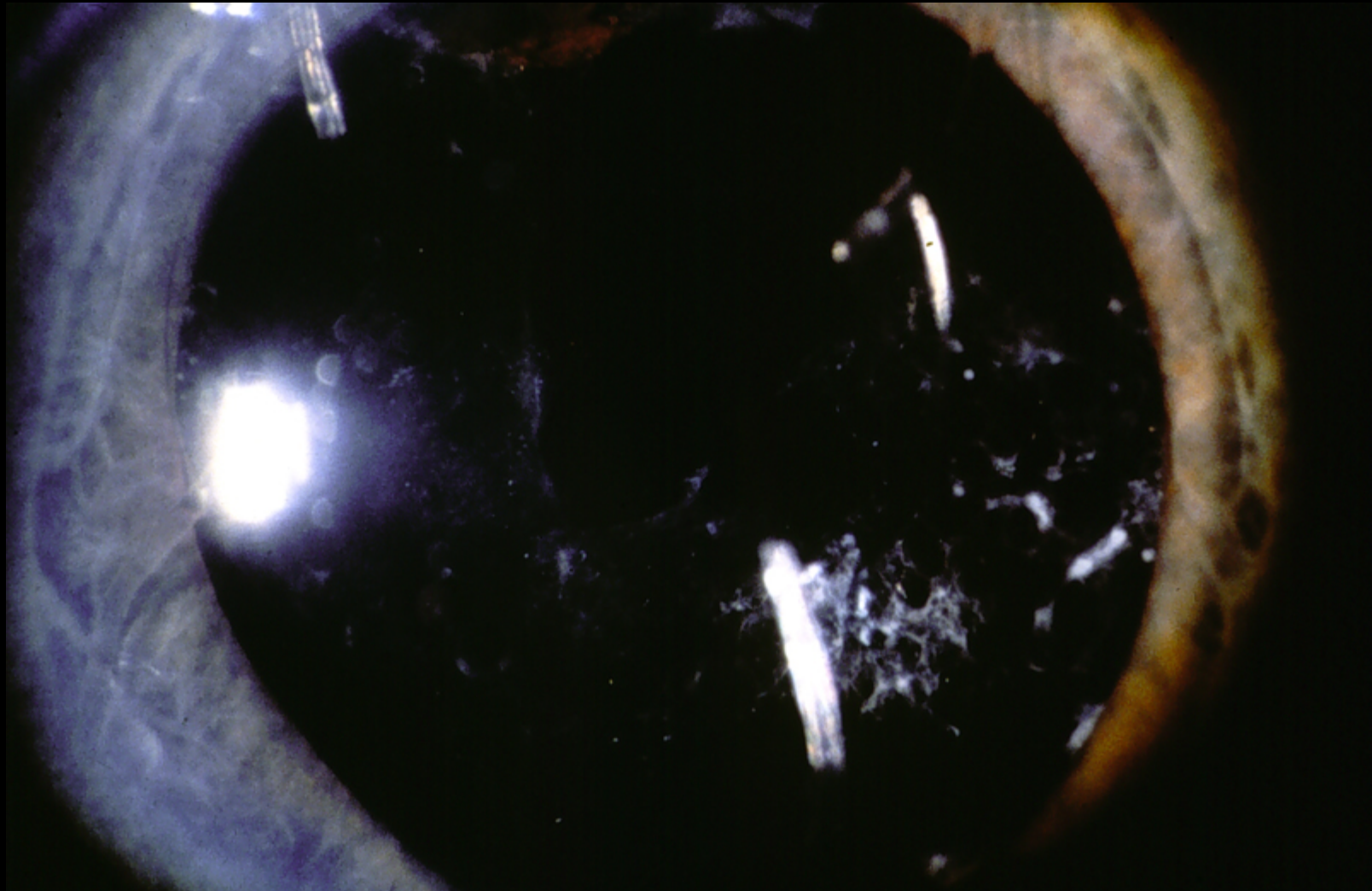


# Anterior capsulotomy





# Posterior capsulotomy



## Vision correction: Lasik

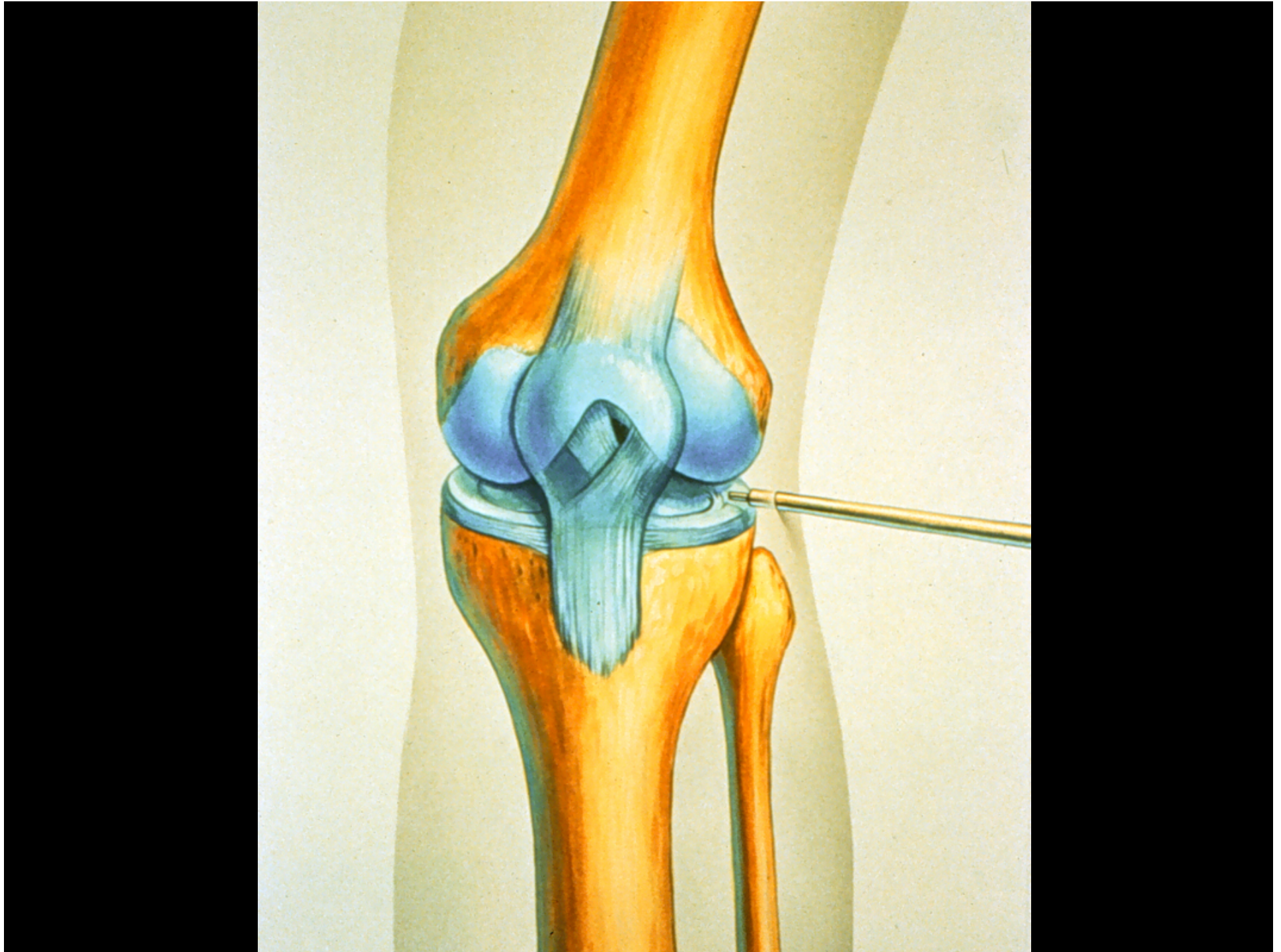


# Endoscopic Surgery





# Arthroscopic surgery: knee



# Entertainment and Display



video: right side vs











**Ringo Star**

# **Military and National Defense**





# Rangefinder, designators



# Airborne target designators



# Countermeasures





# Examples









# Credits...

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- LaserScope
- Newport Corporation
- New Wave Research
- Omnichrome Corp.
- Optical Society of America
- Spectra-Physics
- SPIE - The International Society  
for Optical Engineering
- TRW Space & Electronics Group
- Westinghouse
- Xerox



# **Understanding Laser Technology**

**Breck@LEOMA.com**